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EXAMINER	
SEALEY, LANCE W	
ART UNIT	**PAPER NUMBER**
2671	

DATE MAILED: 03/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/901,611	ELBER, GERSHON	
	Examiner	**Art Unit**	
	Lance W. Sealey	2671	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 July 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,10-26 and 28-50* is/are rejected.

7)☒ Claim(s) *9 and 27* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Allowable Subject Matter

1. Claims 9 and 27 are allowable because no prior art suggests or implies, in a graphical data-compressor, using either Bezier freeform functions, B-spline freeform functions, NURBS, piecewise polynomial equations or rational equations to fit an input surface consisting of a plurality of data points in space into a format suitable for an analyzer which analyzes arbitrary graphical data into constituent geometrical parts.

Claim Rejections - 35 USC § 102

2. The following is a quotation of 35 U.S.C. 102(e) which forms the basis for all novelty-related rejections set forth in this Office action:

A person shall be entitled to a patent unless—

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by applicant for patent.

3. Claims 1-7, 10-11, 13-15, 25, 32-39, 41-42 and 46 are rejected under 35 U.S.C. 102(e) as anticipated by Deering (U.S. Pat. No. 6,525,722).

4. Deering, in disclosing geometry compression for mesh structures, also discloses, with respect to claims 1 and 32, a graphical data-compressor for compression of received, arbitrary graphical data for subsequent transmission (col.3, ll.37-40 and col.4, ll.42-46); said graphical data-compressor comprising

an input for reception of said received arbitrary graphical data (3D graphics source **10**, FIG.4),

an analyzer linked to said input and operable for analysis of said received arbitrary graphical data into constituent geometrical parts (contained within 3-D graphics compression unit **60**, FIG.4, the Deering equivalent to the analyzer decides which parts of the graphical data constitute a regular or irregular surface; **874**, FIG.5. Once the type of surface is determined, it is inherent that the compression method is known; see col.10, ll.1-15),

a scene describer, linked to said analyzer for description of at least some of said constituent geometrical parts as a functional description of said received arbitrary graphical data (not explicitly disclosed, but inherent because once the analyzer decides which parts of the graphical data constitute a regular or irregular surface, there needs to be a way to actually label the surfaces as regular or irregular for the purpose of setting aside different surfaces for different compression methods, namely compressing using the vertex raster format (step **876**, FIG.5) and compressing using the generalized triangle mesh format (step **878**, FIG.5). With respect to the flowchart in FIG.5, the scene describer performs its labeling function between step **874** and steps **876/878**.), and

a transmitter linked to said functional scene describer for transmission of said analytic description (network interface **110**, FIG.4).

5. Regarding claims 2 and 33, Deering does not explicitly disclose an indexer positioned

between said analyzer and said transmitter for indexing said analytic description into an indexed description prior to transmission. However, its existence is inherent for the same reason that the scene describer is inherent. It is in fact reasonable to assume that the scene describer and the indexer are two parts of the same structure: the scene describer is a label that identifies a surface as being regular or irregular, and the indexer is the physical position of the label. Furthermore, Deering discloses that indexing (occurring between step **874** and steps **876/878**, FIG.4) occurs before transmission (step **884**). Therefore, Deering can be properly used to reject claims 2 and 33.

6. Concerning claims 3 and 34, Deering discloses arbitrary graphical data in a format selected from a polygonal graphic representation, a point cloud, an ordered piecewise mesh, or (piecewise) polynomial and rational forms and polynomial, rational and freeform functions (ordered piecewise mesh; FIG.1).

7. Regarding claims 4, 35 and 38, Deering discloses said analyzer for analysis of said graphical data into constituent geometrical parts comprising a pattern matcher matching with a predetermined shape (The "pattern matching" occurs in the sense that Deering scans the geometry data for regular or irregular surfaces; **874**, FIG.5. The "predetermined shape" is a surface; **874**, FIG.5. The examiner believes that construing the predetermined shape as a surface is reasonable because the applicant himself construes "shape" as being many things, including several different types of surfaces—see Fig.4 of applicant's drawings.).

8. With respect to claims 5 and 36, Deering discloses said constituent geometrical part is a predetermined shape (see rejection of claim 4 above), and said analytic description comprises a functional representation of said predetermined shape ("regularly tiled surface portion to be represented as a vertex raster," col.35, ll.9-11. Note that this functional representation includes both the predetermined shape ("regularly tiled surface portion") and how the predetermined shape will look after it has been compressed ("vertex raster")).

9. Concerning claim 6, Deering discloses said functional representation (col.35, ll.9-11) as comprising a basic underlying shape (compressed form of regularly tiled surface portion) together with parameters (connectivity information; col.35, ll.32-35).

10. Regarding claims 7 and 37, Deering discloses said received arbitrary input data comprising a plurality of data points in space (an ordered piecewise mesh, FIG.1, can reasonably be characterized as a plurality of data points in space).

11. With respect to claims 10 and 39, Deering discloses said predetermined shape as being selected from any one of a group comprising lines, curves, planar freeform surfaces, surfaces of revolution, spherical faces, conical faces, cylindrical faces, torroidal faces, ruled surfaces, extrusion surfaces, sweep surfaces, additive combinations thereof and trimmed combinations thereof (planar freeform surfaces, referred to by Deering as "irregular surfaces," col.10, ll.9-12).

12. Concerning claim 11, Deering discloses said scene describer operable to select said

predetermined shape for said constituent geometrical part by analysis of said constituent geometric part to determine fulfillment of conditions associated with said predetermined shape (Deering decides if the constituent geometrical part (portion of the input arbitrary graphical data) is a regular or irregular surface (predetermined shape) by checking to see if the condition of a regular arrangement of vertices defining the polygons used in the mesh is fulfilled; see col.9, ll.47-49).

13. With respect to claims 13 and 41, Deering discloses said functional description as comprising at least a label of an underlying shape (underlying shape is compressed form of regularly tiled surface portion—see col.35, ll.9-11--and label is vertex extent; see col.35, ll.19-21) and parameters for adapting said underlying shape to reconstruct an original shape (connectivity information in the vertex raster, col.35, ll.32-35, is used to decompress the compressed data back to its original shape—see step **1948**, FIG.43).

14. Concerning claim 14, Deering discloses said parameters comprising at least one of a group comprising an orientation, a scale, dimensional parameters and a location (col.36, ll.24-27).

15. Regarding claim 15, Deering discloses said label (vertex extent) as an index (col.35, ll.11-12).

16. With respect to claim 25, Deering discloses an analytic form describer, for describing constituent geometrical parts of arbitrary graphical data as an analytic description; said analytic

form describer comprising a register of predetermined basic geometrical elements (contained within 3-D graphics compression unit **60**, FIG.4, the Deering equivalent to the analytic form describer decides which parts of the graphical data constitute a regular or irregular surface; **874**, FIG.5. Once the type of surface is determined, it is inherent that the compression method is known; see col.10, ll.1-15), and an analytic form fitter for associating said predetermined basic geometrical elements with said geometrical parts (not explicitly disclosed, but inherent because once the analytic form describer decides which parts of the graphical data constitute a regular or irregular surface, there needs to be a way to actually label the surfaces as regular or irregular for the purpose of setting aside different surfaces for different compression methods. With respect to the flowchart in FIG.5, the analytic form fitter performs its labeling function between step **874** and steps **876/878**.).

17. Concerning claim 42, Deering discloses encoding further comprising labeling with a label selected from a predetermined index of labels (the existence of labels is inherent because once the analyzer decides which parts of the graphical data constitute a regular or irregular surface, there needs to be a way to actually label the surfaces as regular or irregular for the purpose of setting aside different surfaces for different compression methods, namely compressing using the vertex raster format (step **876**, FIG.5) and compressing using the generalized triangle mesh format (step **878**, FIG.5) Therefore each element to be encoded is given one of two labels: "regular surface" or "irregular surface" (step **874**, FIG.5)).

18. With respect to claim 46, Deering discloses a graphical data-compressor for compression of received, arbitrary graphical data for subsequent transmission (col.3, ll.37-40 and col.4, ll.42-46); said graphical data-compressor comprising

an input for reception of said received arbitrary graphical data (3D graphics source **10**, FIG.4),

an analyzer linked to said input and operable for analysis of said received arbitrary graphical data into constituent geometrical parts (contained within 3-D graphics compression unit **60**, FIG.4, the Deering equivalent to the analyzer decides which parts of the graphical data constitute a regular or irregular surface; **874**, FIG.5. Once the type of surface is determined, it is inherent that the compression method is known; see col.10, ll.1-15),

a scene describer, linked to said analyzer for description of at least some of said constituent geometrical parts as a functional description of said received arbitrary graphical data (not explicitly disclosed, but inherent because once the analyzer decides which parts of the graphical data constitute a regular or irregular surface, there needs to be a way to actually label the surfaces as regular or irregular for the purpose of setting aside different surfaces for different compression methods, namely compressing using the vertex raster format (step **876**, FIG.5) and

a geometrical part compressor operatively associated with said scene describer and said analyzer, for reduction of constituent geometric parts not described by said describer, into a reduced quantity of data (3-D graphics compression **60**, FIG.4).

19. Accordingly, in view of the foregoing, claims 1-7, 10-11, 13-15, 25, 32-39, 41-42 and 46 have been anticipated under 35 U.S.C. 102(e) by Deering.

Claim Rejections - 35 USC § 103

20. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

21. Claim 8 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering.

22. Concerning claim 8, Deering does not explicitly disclose an applicator for applying a surface fitting function to fit said plurality of data points in space in order to represent said plurality of data points in a format suitable for said analyzer. However, it would have been obvious to a person skilled in the art at the time the invention was made that such an applicator would exist because, as stated above, the Deering equivalent of the applicant's analyzer decides which parts of the graphical data constitute a regular or irregular surface (**874**, FIG.5). Deering also sets forth what constitutes a surface (col.9, ll.41-45). It is therefore obvious that the Deering equivalent of the applicant's applicator must be the element that applies the Deering rule of what constitutes a surface, and that rule is a surface fitting function.

23. Accordingly, in view of the foregoing, claim 8 has been rendered unpatentable under 35 U.S.C. 103(a) by Deering.

24. Claims 12, 26 and 40 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view of Go (U.S. Pat. No. 6,101,277).

25. With respect to claims 12 and 40, Deering does not explicitly disclose the predetermined shape modifiable by trimming. However, this element is disclosed by the Go image encoding and decoding method at col.17, l.66 to col.18, l.24.

26. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering geometry compression method in view of the Go image encoding and decoding method. Such a modification would enable edges to be encoded more efficiently (Go, col.18, ll.19-20).

27. Concerning claim 26, Deering discloses said predetermined basic geometrical elements selected from a group comprising lines, circles, planar surfaces, spherical surfaces, conical surfaces, cylindrical surfaces, torroidal surfaces, surfaces of revolution, ruled surfaces, extrusion surfaces and sweep surfaces (planar freeform surfaces, referred to by Deering as "irregular surfaces," col.10, ll.9-12). Deering and Go combine to disclose "additive and trimmed combinations thereof" in that Go discloses trimmed edges (lines) which are inherently attached to the Deering planar freeform surfaces (Go, col.17, l.66 to col.18, l.24).

28. Accordingly, in view of the foregoing, claims 12, 26 and 40 has been rendered

unpatentable under 35 U.S.C. 103(a) by Deering and Go.

29. Claims 16-23, 28-30 and 43-45 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view of Kono (U.S. Pat. No. 4,772,947).

30. With respect to claim 16, Deering discloses a graphics decompressor comprising a receiver for reception of graphical data in a compressed, functional form (geometry decompression unit ("GDU") **1910**, FIG.42); and

a geometry evaluator, following said receiver, for evaluation of said graphical data in respect of a predetermined set of basic shapes stored at said decompressor (inherent that this would be in the GDU **1910**, FIG.42; see step **1932**, FIG.43 and col.45, ll.17-26).

31. However, Deering does not disclose a piecewise linear surface approximator following said geometry evaluator for reconstruction of said evaluated data on a piecewise basis, into geometrical entities. This is disclosed by the Kono method and apparatus for transmitting compressed data (col.2, l.66 to col.3, l.48, especially col.3, ll.4-31).

32. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering geometry compression method in view of the Kono method. Such a modification would allow for smaller compression of each geometrical entity, thereby allowing for more data to be transmitted at a time (Kono, col.11, ll.1-16).

33. Concerning claims 17 and 43, Deering discloses said compressed functional form (col.35, ll.9-11) as comprising elements having a basic shape (compressed form of regularly tiled surface

portion) associated with parameters (connectivity information; col.35, ll.32-35). Decompressing a functional description of graphical data is accomplished by GDU **1910**, FIG.42. Evaluating said functional description in terms of said plurality of basic geometrical shapes is disclosed at col.45, ll.17-22, especially ll.20-22 (Deering has consistently taught the existence of regular and irregular surfaces—see **874**, FIG.5. These are "a plurality of basic geometrical shapes." Furthermore, it would have been obvious to a person skilled in the art at the time the invention was made that evaluation would occur according to more than one shape; otherwise Deering, in explaining step **1932** in a process of decompression (FIG.43), would not have bothered to bring up the idea of the extent value indicating "the shape of a surface portion" (col.45, l.22)). Finally, col.48, l.36 states that the flowchart in FIG.43 produces a primitive, which is a "geometric entity.")

34. Regarding claims 18-20, Deering discloses a graphics decompressor wherein said reconstruction into geometrical entities is at a selectable resolution level, and said resolution level is selectable in accordance with a context of the data within a scene, said context being a relationship of the data to a background and a foreground within the scene (col.49, ll.55-57; col.43, ll.38-48).

35. With respect to claims 21-22, Deering does not explicitly disclose said selectable resolution level being determinable by available computer resources, said available computer resources being any one of a group comprising memory availability, processor capability, and

available processing time. However, it would be obvious to a person skilled in the art at the time the invention was made that any computer-driven operation would be determinable by the availability of any computer resource, including memory or processor availability or available processing time.

36. Concerning claim 23, Deering discloses said predetermined shape as being selected from any one of a group comprising lines, curves, planar freeform surfaces, surfaces of revolution, spherical faces, conical faces, cylindrical faces, torroidal faces, ruled surfaces, extrusion surfaces, sweep surfaces, additive combinations thereof and trimmed combinations thereof (planar freeform surfaces, referred to by Deering as "irregular surfaces," col.10, ll.9-12).

37. Regarding claim 28, Deering discloses a system for analysis, compression, transmission and decompression of arbitrary graphical data, the system comprising:

a graphical data-compressor for compression of received, arbitrary graphical data, said graphical data-compressor comprising:

an input for reception of arbitrary graphical data (3D graphics source **10**, FIG.4),

an analyzer, linked to said input, for analysis of said received arbitrary graphical data into constituent geometrical parts (contained within 3-D graphics compression unit **60**, FIG.4, the Deering equivalent to the analyzer decides which parts of the graphical data constitute a regular or irregular surface; **874**, FIG.5. Once the type of surface is determined, it is inherent that the compression method is known; see col.10, ll.1-15),

a describer, linked to said analyzer, for description of said constituent geometrical parts as an analytic description (not explicitly disclosed, but inherent because once the analyzer decides which parts of the graphical data constitute a regular or irregular surface, there needs to be a way to actually label the surfaces as regular or irregular for the purpose of setting aside different surfaces for different compression methods. With respect to the flowchart in FIG.5, the scene describer performs its labeling function between step **874** and steps **876/878**.),

a transmitter, linked to said analyzer, for transmission of said analytical description over a data link (network interface **110**, FIG.1),

said system further comprising a graphical data decompressor for decompression of said functional description into geometric entities, the decompressor comprising:

a receiver for reception of said functional description from said data link, and a geometry evaluator for evaluating said functional description in terms of basic geometric shapes, thereby to decompress said compressed graphical data descriptions (network interface **120**, FIG.1); and a

geometry evaluator, following said receiver, for evaluation of said graphical data in respect of a predetermined set of basic shapes stored at said decompressor (inherent that this would be in the GDU **1910**, FIG.42; see step **1932**, FIG.43 and col.45, ll.17-26).

38. Regarding claim 29, Deering does not explicitly disclose an indexer positioned between said analyzer and said transmitter for indexing said analytic description into an indexed description. However, its existence is inherent for the same reason that the scene describer is

inherent. It is in fact reasonable to assume that the scene describer and the indexer are two parts of the same structure: the scene describer is a label that identifies a surface as being regular or irregular, and the indexer is the physical position of the label.

39. With respect to claims 30 and 44, Kono discloses a piecewise linear surface approximator in a decompressor (col.10, ll.13-46).

40. With respect to claim 45, Kono discloses converting said piecewise linear surface approximation into polygonal geometry (col.10, ll.13-46; in reconstructing luminance values for each block, Kono aids in reconstructing individual (four-sided) blocks, which are polygons).

41. Accordingly, in view of the foregoing, claims 16-23, 28-30 and 43-45 have been rendered unpatentable under 35 U.S.C. 103(a) by Deering and Kono.

42. Claim 24 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view of Kono and further in view of Go (U.S. Pat. No. 6,101,277).

43. Neither Deering nor Kono explicitly discloses each basic shape in said set as trimmable with a further basic shape from said set. However, this element is disclosed by the Go image encoding and decoding method at col.17, l.66 to col.18, l.24 (trimming edges before encoding) and col.10, ll.22-28 (decoding to recover the original edge positions).

44. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering geometry compression method in view of the Go image encoding and decoding method. Such a modification would enable edges to be

encoded more efficiently (Go, col.18, ll.19-20).

45. Accordingly, in view of the foregoing, claim 24 has been rendered unpatentable under 35 U.S.C. 103(a) by Deering, Kono and Go.

46. Claim 31 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view of Kono and further in view of Chen et al. ("Chen," U.S. Pat. No. 6,680,976).

47. Concerning claim 31, Deering does not explicitly disclose said data link selected from a group comprising a LAN, WAN, the Internet, a dedicated land link, a dedicated link through the atmosphere, a radio-wave link, and a microwave link. However, this is disclosed by the Chen compression method at col.2, ll.17-19.

48. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering geometry compression method in view of the Chen compression method. Such a modification would allow support for a consumer computer phenomenon that has experienced exponential growth and widespread recognition for the past few years (Chen, col.1, ll.26-29).

49. Accordingly, in view of the foregoing, claim 31 has been rendered unpatentable under 35 U.S.C. 103(a) by Deering, Kono and Chen.

50. Claims 47-48 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view of Lyche et al., "Knot removal for parametric B-spline curves and surfaces" ("Lyche").

51. Although Derring discloses a geometrical part compressor, Derring does not disclose,

with respect to claim 47, a geometrical part expressable as at least one spline having knots and a knot remover for identifying and removing knots having no effect on reproduction of the part. However, these elements are disclosed, directly or indirectly, by Lyche.

52. The first paragraph of Section 2, “Coefficient norms for B-spline curves and surfaces,” on p.218 discloses a parametric B-spline curve with knots. Knot removal is disclosed in the third paragraph of the same section. Item 10 on p.229 states that knot removal can be applied to data compression.

53. Lyche does not address the issue of reproduction of the geometric part. However, since Deering discloses lossless compression at col.9, ll.6-8, this element is disclosed as well.

54. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering geometry compression method in view of the Lyche discussion on knot removal. Such a modification would minimize storage usage by storing polygons with fewer points (Lyche, Item 10, p.229).

55. Concerning claim 48, Lyche discloses a pattern identifier for identifying patterns of knots (which knots are most significant in representing the spline where the knots reside; see “3. Knot removal for parametric B-spline curves,” fourth paragraph, pp.220-221) and an indexer for replacing each identified pattern with an index (weights are used as indexes to indicate the significance of a knot; see “3. Knot removal for parametric B-spline curves,” fourth paragraph, pp.220-221).

56. Accordingly, in view of the foregoing, claims 47-48 have been rendered unpatentable under 35 U.S.C. 103(a) by Deering and Lyche.

57. Claim 49 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view of Demmel, Applied Numerical Linear Algebra.

58. Deering does not disclose a least squares approximator reducing said geometrical part into a least squares approximation. However, this is disclosed by the Demmel linear algebra textbook example at pp.114-117.

59. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering geometry compression method in view of Demmel's application to a linear algebra theorem to compression. Such a modification would minimize storage usage by permitting storage of many fewer numbers in the compression process (Demmel, p.114 before first full paragraph).

60. Accordingly, in view of the foregoing, claim 49 has been rendered unpatentable under 35 U.S.C. 103(a) by Deering and Demmel.

61. Finally, claim 50 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view of Kostrzewski et al ("Kostrzewski," U.S. Pat. No. 6,487,312).

62. Deering does not disclose the geometrical part compressor having a reducer for reducing said object and a degree of reduction identifier for identifying redundancy to give a minimal polynomial degree required for correct reproduction of said part. However, these elements are

disclosed by the Kostrzewski compression method. "Reducing said object" is performed in step 3 in FIG.9, and the reducer is the DTC compressor **24**, FIG.17). The degree of reduction identifier for identifying redundancy is implied (if step 3 in FIG.9 can perform the reduction by optimizing each model segment, it would be obvious to a person skilled in the art at the time the invention was made that redundancy would be identified that would trigger such optimization). Finally, yielding a minimal polynomial degree required for correct reproduction of said part is disclosed at FIG.10, steps 4-12.

63. Accordingly, in view of the foregoing, claim 50 has been rendered unpatentable under 35 U.S.C. 103(a) by Deering and Kostrzewski.

Conclusion

Any inquiry concerning this communication or earlier communications from the Office should be directed to the examiner, Lance Sealey, whose telephone number is (703) 305-0026. He can be reached Monday-Friday from 7:00 am to 3:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman, can be reached at (703) 305-9798.

Any response to this action should be mailed to:

MS Non-Fee Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

or faxed to:

(703) 872-9306

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Mark Zim

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